



STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION



December 11, 2009

Commissioner Robert M. Ward
Connecticut Department of Motor Vehicles
60 State Street
Wethersfield, Connecticut 06161

Re: Evaluation of the Exclusive Utilization of On-Board Diagnostic Testing for Connecticut's Motor Vehicle Inspection and Maintenance Program Pursuant to Public Act 09-187, Section 55

Dear Commissioner Ward:

In 2009, the Connecticut General Assembly enacted Public Act 09-187 (the Act). The Act directed the Departments of Environmental Protection (DEP) and Motor Vehicles (DMV) to evaluate whether the present system for conducting motor vehicle emissions inspections could be replaced, upon expiration of the existing contract for providing such inspection system, by a system based on the exclusive utilization of onboard diagnostic (OBD) information systems for 1996 and newer motor vehicles, and remain in compliance with the requirements of the Clean Air Act (CAA). DEP and DMV staff developed the enclosed evaluation in accordance with the provisions of the Act. The evaluation provides a review of the CAA requirements, the present Inspection and Maintenance (I/M) program, future options for emissions testing, the emission reductions being achieved by the present program, and those expected to be needed in the future.

The enclosed report concludes that the current Connecticut I/M program meets the requirements of the CAA and a change to the exclusive utilization of OBD-only testing would significantly reduce the air quality benefits associated with the program. The CAA would require Connecticut to account for the lost air quality benefits of such a change by either increasing program stringency (e.g., require annual OBD testing and forgo the current program exemption for new vehicles) or require emission reductions from other sectors (e.g., additional environmental restrictions on Connecticut's business and industry). This conclusion is consistent with the U.S. Environmental Protection Agency's (EPA's) 2008 report on Transitioning Inspection and Maintenance Issues and EPA's conclusion that areas in need of continued emissions reductions may not only need to test OBD-equipped vehicles, but also maintain tailpipe testing of non-OBD equipped 1995 and older model year vehicles.

I want to thank you and your staff for your efforts in maintaining an effective motor vehicle inspection and maintenance program. Connecticut's program has been cited as a national model and is an integral strategy to the state's air quality improvement efforts. I look forward to DMV's continued support in maintaining the clean air benefits that the I/M program provides to Connecticut's citizens. If you have any questions on the enclosed report, please call me at (860) 424-3571.

Yours truly,

Amy W. Marrella
Commissioner

AWM/ep

Public Act 09-187, § 55

**EVALUATION OF THE EXCLUSIVE UTILIZATION OF
ON-BOARD DIAGNOSTIC TESTING FOR CONNECTICUT'S
MOTOR VEHICLE INSPECTION AND MAINTENANCE
PROGRAM**

State of Connecticut
Department of Environmental Protection

December 11, 2009

Executive Summary

Connecticut's Motor Vehicle Inspection and Maintenance (I/M) Program is mandated by section 182(c)(3) of the federal Clean Air Act (CAA) because Connecticut's air quality fails to meet the National Ambient Air Quality Standard (NAAQS) for surface level ozone (i.e., smog). The program is required to identify grossly emitting vehicles and ensure they are properly repaired. Based on United States Environmental Protection Agency (EPA) approved modeling, in 2010 the I/M program is projected to produce 19 of the 200 tons of emission reductions in Connecticut each day. This represents an enforceable commitment in Connecticut's State Implementation Plan (SIP) and a significant component of Connecticut's strategy to ensure that the state is positioned to attain the ozone NAAQS. The ozone NAAQS is a health based standard which is periodically revised to take into account the latest public health science. Based on the latest science, EPA is expected to issue a more stringent standard within the next several months. It is unlikely that Connecticut's air quality will meet this standard, resulting in the need to achieve even greater emission reductions from motor vehicles. As such, the state should only be looking for ways to get more reductions, not fewer.

The Connecticut I/M program dates back to 1983 and is managed by the Department of Motor Vehicles. The Department of Environmental Protection ensures that the program achieves the air quality benefits committed to in Connecticut's SIP. Connecticut has consistently conducted a thoughtful analysis of its I/M program and has made numerous enhancements since its initiation. Since 1998, Connecticut has evaluated the program regularly and provided reports on the effectiveness of the program to EPA, in compliance with 40 CFR 51.366. These evaluations have repeatedly demonstrated that the program is well managed and produces the expected air pollutant reductions.

Section 55 of Public Act 09-187 requires:

The Connecticut Department of Environmental Protection (DEP) and the Department of Motor Vehicles (DMV), with the use of appropriate models, approved by the federal Environmental Protection Agency, to evaluate whether the present system for conducting motor vehicle emissions inspections could be replaced, upon expiration of the existing contract for providing such inspection system, by a system based on the exclusive utilization of onboard diagnostic (OBD) information systems for model year 1996 and newer motor vehicles, and remain in compliance with the requirements of the Clean Air Act.

This report addresses the requirements of Section 55 through a review of the CAA requirements including approved modeling methodology, Connecticut's present I/M Program, future options for emissions testing, the emissions reductions being achieved by the present program and those projected to be required by the EPA. This report also identifies potential challenges for implementing these options and the cost-effectiveness of various options to assess whether an OBD-only program would allow the state to remain in compliance with CAA requirements.

As part of Connecticut's annual program review in 2009, emerging programs were evaluated and options for Connecticut were assessed. The review revealed that four states are dropping or planning to

drop tailpipe tests for pre-1996 vehicles in favor of OBD-only inspections. Massachusetts, which already requires an annual motor vehicle safety test, changed their emissions inspection frequency from biennial to annual and eliminated exemptions for new cars to maintain environmental benefits. Massachusetts is very different from Connecticut since their residents are accustomed to annual safety vehicle inspections and the annual OBD test is being done at the same time as the safety test. Massachusetts can also demonstrate that it meets the 1997 8-hour ozone NAAQS.

Implementing an OBD-only program would eliminate tail pipe testing on pre-1996 motor vehicles. Without the tailpipe testing, an OBD-only program would result in fewer emissions reductions and allow gross polluters to continue to be registered and operate. Fewer tests will also have an adverse effect on small businesses that currently implement the I/M program.

EPA-approved modeling indicates that Connecticut will need to maintain the current testing schedule until at least 2020 before an OBD-only program will yield the same emission reduction benefits as the current program. As such, maintaining the current program is the only feasible option for Connecticut to maintain the air quality benefits required by the SIP. Reducing the effectiveness of the current program will also raise the issue of backsliding. Backsliding, which is prohibited by the CAA, occurs when a program is eliminated or replaced with a new program resulting in fewer emissions reductions than in the SIP-approved program being replaced. Without the ability to test and repair older vehicles, Connecticut would have little recourse for remediating the shortfall in emissions reductions that would be precipitated by an OBD-only testing program other than to impose greater restrictions on business and industry, to require onerous requirements on light duty and heavy duty vehicles, or both. It is imperative that Connecticut retains the emission reduction benefits from the current program to avoid triggering such anti-backsliding measures and to continue our progress towards attainment of the ozone standard.

Innovative testing strategies, such as kiosks and remote OBD, as evidenced by other states experiences, do not have a proven track record at this time. Kiosks, in particular, have safety and fraud issues that must be resolved before the system can be used for official inspections. Remote OBD presents a number of implementation problems due to the initial costs to the customer and the state, the need for universal installation, and the need to have the ability to recall failing vehicles. Each of these issues would need to be addressed prior to EPA approval of the program revision.

This report concludes that it is premature to consider the exclusive utilization of OBD-only testing in Connecticut as a means of complying with the requirements of the CAA since the state needs to maintain the emission reduction credits being achieved by the current program. This conclusion is consistent with EPA's 2008 report on transitioning I/M issues, which states that areas may need to continue tailpipe testing of the pre-OBD fleet if they are in need of continued reductions. Connecticut has little recourse for remediating the shortfall in emissions reductions that would be precipitated by an OBD-only testing program since it would be hard-pressed to identify another program that will be as cost-effective and achieve the necessary reductions.

Introduction

Connecticut's Motor Vehicle Inspection and Maintenance (I/M) Program is mandated by the Clean Air Act (CAA). Connecticut's program dates back to 1983 and results in significant air quality benefits. The program has a long history of effectively reducing vehicle emissions and is a key component of Connecticut's strategy to ensure that the state is positioned to attain the National Ambient Air Quality Standard for ozone. Any changes to the program need to either preserve or increase emissions benefits. Changes that do not realize such benefits will require an alternate program to prevent backsliding, the loss in air quality benefits. In December 2009, the United States Environmental Protection Agency (EPA) is expected to propose a more stringent ozone standard. This new standard will result in needing even more reductions from motor vehicles. The state should only be looking at ways to get more reductions, not fewer.

The Connecticut Department of Motor Vehicles manages the I/M program; the Connecticut Department of Environmental Protection ensures that the program achieves the air quality benefits committed to in Connecticut's State Implementation Plan. Connecticut has consistently conducted a thoughtful analysis of its I/M program and has made numerous enhancements since its initiation. Since 1998, Connecticut has evaluated the program regularly and provided reports on the effectiveness of the program to EPA, in compliance with 40 CFR 51.366. These evaluations have repeatedly demonstrated that the program is well managed and produces the expected air pollutant reductions. The MOBILE6.2 modeling method, presently approved by EPA, projects that in 2010, this important program will result in approximately 19 of the 200 tons per day of air pollutant reductions that are included in Connecticut's 2008 Ozone Attainment Plan.¹

On July 8, Governor M. Jodi Rell signed Public Act 09-187, *An Act Concerning the Functions of the Department of Motor Vehicles*.² Section 55 of the act requires:

The Connecticut Department of Environmental Protection (DEP) and the Department of Motor Vehicles (DMV), with the use of appropriate models, approved by the federal Environmental Protection Agency, to evaluate whether the present system for conducting motor vehicle emissions inspections could be replaced, upon expiration of the existing contract for providing such inspection system, by a system based on the exclusive utilization of onboard diagnostic (OBD) information systems for model year 1996 and newer motor vehicles, and remain in compliance with the requirements of the Clean Air Act.

The report is due six months before a new motor vehicle inspection and maintenance contract is finalized.

¹ Connecticut's 8-Hour Ozone Attainment Plan, submitted to EPA on February 1, 2008:
http://www.ct.gov/dep/cwp/view.asp?a=2684&q=385886&depNav_GID=1619.

² Appendix A: Public Act 09-187, Section 55, *An Act Concerning the Functions of the Department of Motor Vehicles*.
<http://www.cga.ct.gov/2009/ACT/Pa/pdf/2009PA-00187-R00SB-01081-PA.pdf>, at page 62.

This report addresses the requirements of Section 55 through a review of the CAA requirements including approved modeling methodology, Connecticut's present I/M Program, future options for emissions testing, the emissions reductions being achieved by the present program and those projected to be required by the EPA. This report also identifies potential challenges for implementing these options and estimates the cost-effectiveness of various options in its assessment of whether an OBD-only program would allow the state to remain in compliance with CAA requirements.

Clean Air Act Requirements

Section 182(c)(3) of the CAA mandates states, such as Connecticut, that have areas designated as serious or severe non-attainment for ozone to conduct an I/M program to reduce emissions of hydrocarbons (HC) and oxides of nitrogen (NO_x) from in-use motor vehicles. Connecticut has operated an I/M program since 1983 as a vital part of the state's efforts to attain the National Ambient Air Quality Standard (NAAQS) for ozone.

The I/M program is a strategy originally required to address Connecticut's non-attainment of the 1-hour ozone standard of 124 parts per billion (ppb).³ The EPA adopted the first 8-hour ozone standard in July of 1997 to protect public health by extending the duration of the ozone monitoring to an 8-hour period, which better reflects the exposure of those who regularly work or engage in recreation outdoors. In April 2004, EPA promulgated a more stringent 8-hour ozone standard of 84 ppb, which was based on updated health information. The CAA requires that such standards be reviewed every five years and revised or made more stringent if necessary. In 2008, due to more current information, EPA again revised the 8-hour standard to a more stringent 75 ppb. In December 2009, the EPA is expected to propose an even more stringent ozone standard. This new standard will result in needing even more reductions from motor vehicles. The state should only be looking at ways to get more reductions, not fewer.

Any state that includes areas not in attainment with any NAAQS must prepare a State Implementation Plan (SIP) which sets out the state plan for attaining the standard. The plan includes measures that will reduce emissions and provide enforceable reductions toward meeting the state's attainment goals. After appropriate notice and review at the state level, the SIP with its enforceable requirements must be submitted to EPA for approval.

As part of the promulgation of the 8-hour ozone standard in April 2004, the EPA required states to maintain all measures previously implemented to attain the 1-hour ozone standard to prevent backsliding. Backsliding occurs when a different program results in fewer emissions reductions or credits than the program it replaces. If backsliding occurs, the EPA requires states to identify additional mobile, area or stationary source controls to compensate for the difference in environmental benefits.⁴

³ Fairfield County, CT is designated as a severe ozone non-attainment area. Greater CT is a serious ozone non-attainment area.

⁴ 69 FR 23931.

Connecticut's I/M program is one of the most important state strategies to lower the emissions of ozone precursors.

If the EPA finds that Connecticut is not implementing a requirement of its approved plan to attain the 8-hour ozone standard, section 179(b) of the CAA allows EPA to impose sanctions that may include a prohibition on the approval of highway projects or of grants for such projects as capital programs for public transit.

Emissions Modeling

Emissions reduction determinations are estimated using modeling that is approved by the EPA. Presently the official model is MOBILE6.2, which was used for this report. EPA expects to begin implementing the use of a new model, MOVES, by the end of 2009. At that time, the state will be required to use MOVES for attainment and conformity demonstrations. This model is in the developmental phase. There is some indication that with MOVES I/M emission credits for OBD inspections may be further reduced, thus suggesting that eliminating tailpipe tests and relying on OBD inspections alone will result in a more severe reduction of environmental benefits and a greater degree of backsliding from the enforceable reductions presently gained through the program.

Connecticut's Current Motor Vehicle Inspection & Maintenance Program

In an I/M program, motor vehicles are periodically inspected, and when there is evidence that their emissions exceed design standards, the vehicles must be repaired. Connecticut's current I/M program identifies motor vehicles that have been tampered with or have received improper maintenance. These motor vehicles must be repaired so as to comply with emission standards. The DMV manages the I/M program, while the DEP ensures that the program achieves the air quality benefits outlined in Connecticut's SIP. The latest EPA-approved revision to Connecticut's SIP for the Enhanced Motor Vehicle I/M Program provides a detailed description of the program.⁵ Connecticut currently tests all gasoline and diesel-powered motor vehicles with gross vehicle weight ratings (GVWRs) of 10,000 lbs or less between four (4) and twenty-five (25) years of age

Gasoline-powered motor vehicles currently receive the following inspections:

1. 1996 and newer: OBDII-only tests.⁶
2. Pre-1996:
 - a) 8,500 lbs GVWR or less. Gas cap test plus a loaded mode test: The loaded-mode test that is currently used is the Acceleration Simulation Mode Test (ASM). ASM testing

⁵ Revision to Connecticut's SIP on the Enhanced Motor Vehicle Inspection and Maintenance Program: http://www.ct.gov/dep/lib/dep/air/regulations/proposed_and_reports/final2007_im_sip_revision.pdf.

⁶ The current OBD electronic system that includes the most up-to-date comprehensive system monitors starting with model year 1996 vehicles.

evaluates HC, CO, and NOx emissions under moderate load at 25 mph. Motor vehicles are tested while being driven on a stationary treadmill-like device termed a dynamometer.

- b) Greater than 8,500 lbs and 10,000 lbs GVWR or less. Pre-Conditioned Two-Speed Idle (PCTSI): PCTSI is a test of HC and CO emissions at idle and high idle (2,500 rpm) conditions.

Diesel-powered motor vehicles currently receive the following inspections:

1. 1997 and newer: OBDII-only tests.⁷
2. Pre-1997:
 - a) 8,500 lbs GVWR or less. Loaded-Mode Diesel (LMD): LMD is a test using a dynamometer to simulate driving at 30 mph. Exhaust smoke opacity is measured.
 - b) Greater than 8,500 lbs and 10,000 lbs GVWR or less. Modified Snap Idle (MSA): MSA is a modified version of the SAE J1667 test, to make the test suitable for light-duty diesels. Exhaust smoke opacity is measured.

Future Testing Options

For purposes of this study, Connecticut evaluated the options of continuing the test procedures used presently and the potential implementation of an OBD-only Program:

- **Current Test Procedure:** Continue to perform gas cap and ASM or PCTSI tests on eligible pre-1996 models and OBD inspections on 1996 and newer models.
- **OBD-only Program:** Only perform OBD inspections on 1996 and newer models. Pre-1996 motor vehicles or 1996 and newer motor vehicles without OBD systems would be exempt from testing.

In 2008, a total of 852,371 motor vehicles received initial tests.⁸ Of these 852,371 motor vehicles, 76% received OBD tests, 23% received either an ASM or PCTSI test, and the remaining 1% received LMD or MSA tests.

As of May, 79% of the motor vehicles inspected in Connecticut in 2009 received OBD inspections. While this percentage is expected to increase each year as 1995 and older models without OBD systems are dropped from the program, older motor vehicles remaining in the program emit more pollutants per mile than newer motor vehicles and will increase their emissions as they continue to age; 1995 and older

⁷Connecticut tests motor vehicles 10,000 lbs GVWR or less. Motor vehicles that are greater than 8,500 lbs GVWR receive the appropriate tailpipe test.

⁸ Appendix B: 2008 Annual Evaluation of Connecticut's Inspection and Maintenance Program, June 2009.

models account for a significant fraction of motor vehicle emissions now, and are projected to be significant contributors to air pollution in the future. In addition, in 2010, ASM-PCTSI emission tests on pre-1996 models are estimated to account for 25% of the I/M program benefits.⁹ Since Connecticut's fleet turnover is historically slower than other jurisdictions, pre-1996 testing will remain environmentally relevant in Connecticut.

An OBD-only program, which drops the tailpipe test for motor vehicles without OBD systems, would have eliminated testing for 24% of the vehicles tested in 2008, resulting in a loss of the emission reduction credits in Connecticut's SIP. With this option, gross polluting motor vehicles, typically older models with excessive emissions, would no longer be subject to testing, but could continue to be registered and driven. With no periodic testing of pre-1996 vehicles, owners may choose to no longer repair older motor vehicles, potentially leading to increased emissions and diminished air quality.

OBD-only programs could be implemented in several ways. OBD testing could be conducted at emissions stations within a centralized or decentralized network. Alternatively, on-road testing, using wireless devices could be conducted. With regard to innovative OBD testing strategies such as kiosks and Remote OBD, EPA's 2008 report on transitioning I/M concludes that such technologies are unproven at this time. Kiosks have safety and fraud issues that would need to be resolved, thereby increasing the cost to the state. Furthermore, implementation of Remote OBD would be problematic due to customers' initial cost, the need for universal installation and an inability to recall failing vehicles to guarantee EPA approval.¹⁰

EPA will only grant SIP emissions credit for a program that uses on-road testing if the program requires out of cycle inspection repairs for failing vehicles. To maintain SIP credits, the legislature would have to enact statutory revisions to incorporate these out of cycle inspection repairs as well as to change to an OBD-only testing program. Furthermore, reductions from additional sources would have to be sought to prevent the backsliding from an OBD-only program, which produces fewer emissions reductions than the current program. Finding these additional reductions would be problematic for Connecticut. The emissions reduction benefits of both options are discussed with more detail in the following section.

Emission Reductions of Future I/M Program

Due to the anti-backsliding requirements of the CAA, any changes to an I/M program must provide emissions reduction benefits at least equivalent to the present program. The emission reductions for changes to Connecticut's I/M program were examined with a focus on HC and NO_x emissions as they are the primary ozone precursors. Using EPA's MOBILE6.2 model, DEP projected the emission reductions for the current testing program and an OBD-only program. The table below presents the emission reductions for the OBD-only option relative to the current program through the year 2020.

⁹ Based on MOBILE6.2 modeling of I/M program benefits. The model uses Connecticut-specific data on fleet characteristics to estimate mobile source emission factors for Connecticut's fleet.

¹⁰ Appendix C: *Transitioning I/M: Options for Inspection and Maintenance in the OBD Dominated Fleet*, U.S. EPA April 2008. Hereinafter referred to as: *Transitioning I/M*, April 2008.

This analysis is based on the parameters established by state statute, including exempting from testing those vehicles that are four (4) or less or twenty-five (25) or more model years of age and continuing inspections on a biennial basis.

Emission Reductions for Inspection Options

Option	% of Reductions							
	2012		2015		2017		2020	
	HC	NOx	HC	NOx	HC	NOx	HC	NOx
Current Test Schedule	100%	100%	100%	100%	100%	100%	100%	100%
OBD-only Program (Drop Tailpipe Testing)	84%	88%	93%	95%	95%	97%	100%	100%

The above table demonstrates that Connecticut's current program provides better emission reductions than an OBD-only program. Future program options must provide emissions reduction benefits at least equivalent to the present program in order to be viable options. However, this table shows that an OBD-only program will not achieve the level of emissions reductions achieved by the present program until the year 2020. Based on MOBILE6.2, in 2012, an OBD-only program achieves 84% of the tons per day HC reductions and 88% of the tons per day NOx reductions that the current program achieves. In 2015, OBD-only achieves 93% and 95% of the HC and NOx reductions respectively. Although the emissions reductions increase over time, since 100% of the emissions reductions achieved by the present program aren't realized until 2020, an OBD-only testing scenario that would comply with the CAA requirements would not be feasible in Connecticut at this time.

As stated previously, if 1995 and older motor vehicles were exempted from inspections under an OBD-only scenario, backsliding becomes an issue. EPA regulations prohibiting backsliding are discussed in the 8-hour Ozone Implementation Rule published April 30, 2004.¹¹ The reduced effectiveness of an OBD-only program would create a shortfall and would not demonstrate equivalency under EPA regulations. The OBD-only scenario results in significant backsliding in HC and NOx. As stated in EPA's April 2008 report on Transitioning I/M,¹² "the best time to make the transition from a mix of tailpipe and OBD testing to OBD-only testing will vary from state to state...In areas that are in need of continued reductions from the pre-OBD fleet, periodic tailpipe testing of these motor vehicles may need to be retained for quite some time."

Maintaining the current testing schedule, at least until 2020, when an OBD-only program would yield the same emission reductions, will maintain the air quality benefits dictated by the CAA. Connecticut

¹¹ 69 FR 23931.

¹² *Transitioning I/M*, April 2008.

must have the reductions it is getting from the current program to make progress towards attainment of the ozone standard.

Connecticut is pursuing a number of strategies to create additional ozone precursor emissions reductions as part of its ozone attainment strategy. In collaboration with other states in the region, Connecticut is developing a number of control measures for stationary and area sources, examples of which are listed in the following table. These measures supplement a series of far-reaching control measures adopted between the 2001-2006 to reduce ozone precursors, including regulation of consumer and commercial products, such as glues, deodorant and hair sprays.

Potential Stationary and Area Source Reduction Measures

NO_x Measure	State Rules	National Measure	Emissions Reduction	Cost
Boilers Serving Electric Generating Units (EGUs)	DE, NJ, MA, MD	*	413 TPD OTR	\$1,100 - \$8,700 per ton
New Small Gas Boilers	CA, TX	*	53 TPD OTR	\$3,300 - \$16,000 per ton
Municipal Waste Incinerators	NJ, MD	*	14 TPD OTR	\$2,140 per ton (SNCR)
High Electric Demand Day EGUs	NJ	*	TBD	\$45,000 - \$300,000 per unit
Stationary Generator Regulation (DG)	DE, MA, MD, NJ	*	TBD	\$39,700 - \$79,700 per TPD
Minor New Source Review	DE, CT, MD, MA, NJ, RI	*	TBD	\$600 - \$18,000 per ton
VOC (HC) Measure	State Rules	National Measure	Emissions Reduction	Cost
Architectural and Industrial Maintenance Coatings rule	CA	*	50 TPD OTR	\$2,240 per ton
Auto Refinishing	CA	*	21 TPD OTR	\$2,860 per ton
Consumer Products 2006	CA	*	19 TPD OTR	\$7,700 per ton
Lower VOC Solvent Degreaser	MD, CA	*	13 TPD OTR	\$1,400 per ton
Large VOC Storage Tanks	MD, NJ	*	TBD	\$2,288 - \$29,000 per ton
Minor New Source Review	DE, CT, MD, MA, NJ, RI	*	TBD	TBD

In addition to the above programs, DEP will need to consider a whole new suite of control measures for evaluation if any credit is lost from the I/M program. New control measures would be necessary both to avoid backsliding from the existing I/M program and to comply with EPA's more stringent ozone standard. The DEP has not analyzed the following strategies at this juncture; very few states have even identified these as potential reduction strategies. Additional evaluation is necessary before projections on potential emission reduction benefits and corresponding costs can be quantified. More difficult and costly control measures, to make up the lost benefits of the I/M program, may include:

- Further reducing emissions from industrial and commercial sources
- Reducing and strictly enforcing speed limits of 55 mph
- Retrofitting heavy-duty on-road and off-road engines
- Restricting outdoor and restaurant barbeques
- Restricting and reduce parking resources in cities
- Electrify rail lines and truck stops
- Restricting the use of off-road engines and generators
- Requiring employee commute programs
- Alternate day driving restrictions
- Buy-back old lawn and garden equipment
- Highway congestion pricing
- Increasing mass transit subsidies

Identification of Gross Polluters

Gross polluters typically are older models with excessive emissions, usually resulting from worn-out or malfunctioning emission control systems. Identification and repair, or removal, of gross polluters provides significant emissions benefits, and addresses the public's concern over high emitting motor vehicles. Based on the most recent on-road emissions survey conducted in Connecticut, about 5% of the vehicle fleet is gross polluting. These motor vehicles account for over 50% of the HC emissions.¹³ A majority of the gross polluters were 1995 and older models. In addition to creating a shortfall in SIP credit due to backsliding, OBD-only scenarios allow older motor vehicles, which may potentially have excessive emissions, to continue to be registered and operated. This situation can erode public support of the program, in addition to harming air quality. New motor vehicle owners view this as an inequity, as they would continue to be subject to testing their vehicles while older, more polluting motor vehicles are exempted from testing.

Continuing testing of pre-1996 motor vehicles will address the concern over gross polluters. Although the PCTSI test does not include NOx, it is adequate to identify most gross polluters. Most gross polluters exceed HC standards by a much larger fraction than they exceed NOx standards, because engine wear and improper maintenance tend to increase HC more than NOx emissions.

¹³ EPA's enhanced I/M performance standard requires that states sample 0.5% of the motor vehicles tested in their I/M programs in independent on-road emissions tests. Every other year, Connecticut conducts an on-road emissions survey using remote sensing devices (RSD). The last survey was done in summer 2007. Gross polluters in this analysis are defined as motor vehicles that exceed 3% CO, 500 ppm HC, and 2000 ppm NOx.

Challenges of Implementing an OBD-only Program

A recent review of North American I/M Programs¹⁴ showed that several states, including Massachusetts, Illinois, Wisconsin and Missouri, have recently dropped, plan to drop or are exploring the option of dropping tailpipe tests for pre-1996 motor vehicles. The programs will consist of OBD inspections alone. These states must make-up for the loss of the air quality benefits by performing more frequent inspections, eliminating exemptions for new vehicles and/or requiring additional controls on mobile, stationary and/or area sources.

In the summer of 2008, Illinois dropped tailpipe tests, and now only inspects 1996 and newer models with an OBD test. Since Illinois did not claim full environmental benefits or emission reductions for their previous program with tailpipe tests, there is technically no backsliding. However, there will be an increase in emissions from those older models that are not properly maintained. The public has raised concerns over the Illinois plan to exempt older motor vehicles, including gross polluters.

Missouri dropped tailpipe tests in spring 2008. Missouri plans to implement a combination of enhancements to their current program and additional control measures in other areas that will compensate for the shortfall they experience. To date, Missouri has not identified these strategies.

Wisconsin is evaluating proposals to set-up an OBD-only program in 2010. Wisconsin has not yet publicized how they will make up for any backsliding.

It would only be possible to increase the benefits of a Connecticut OBD-only program and address backsliding by increasing the frequency of testing to an annual inspection and eliminating the exemptions for new motor vehicles. While Massachusetts has taken this approach, Massachusetts requires annual vehicle safety inspections, so its motorists are accustomed to visiting inspection stations each year. Connecticut's situation is much different. Changing to an annual test and removing the exemption for newer motor vehicles is not authorized by state statute. Legislative approval of these statutory changes would be required to accommodate such a change. In addition, mandating annual testing to accommodate an OBD-only program would necessitate an adjustment to the registration fees of new motor vehicles. The potential loss of these fees would reduce the revenue generated by the I/M program, and would require additional legislative action. Finally, if an OBD-only program was adopted, a revision of Connecticut's I/M SIP would have to be drafted, made available for public review and submitted to EPA for approval.

A recently prepared analysis of I/M options in Connecticut shows that switching to an annual OBD test will increase the overall cost for Connecticut's I/M program to some motorists by 40%.¹⁵ Sans a legislative adjustment, inspection fees for owners of 1996 and newer motor vehicles will double, while owners of pre-1996 models would pay nothing. Based on 2009 program data, approximately 20% of the motor vehicles currently receiving tests are model year 1995 and older. If Connecticut implemented an

¹⁴ Appendix D: *Analysis of Future Options for Connecticut's Inspection/Maintenance (I/M) Program*, June 2009.

¹⁵ IBID.

OBD-only program, testing stations would inspect fewer vehicles, resulting in a decrease in revenue, likely having an adverse affect on small businesses.

Cost-effectiveness of Future I/M Programs

The costs of continuing the current inspection schedule or implementing an OBD-only program are estimated in terms of dollars per ton of HC and NOx removed from the environment. This analysis uses the current biennial test fee of \$20 per vehicle for both scenarios. Total fees are based on the statutory requirement that the newest four (4) model years and motor vehicles more than 25 years old continue to be exempted. Total repair costs are based on estimated repair costs per vehicle multiplied by the number of motor vehicles failing inspection. Although 2010 is used in Connecticut's 2008 Ozone Attainment Plan due to federal requirements, this evaluation used 2012 since it represents the start of a new inspection cycle. The difference in estimated benefits can be attributed to changes in modeling projections and inputs, such as an increase in vehicle miles traveled from 2010 to 2012. In an *Analysis of Future Options for Connecticut's Inspection/Maintenance (I/M) Program*, prepared in June 2009,¹⁶ cost-effectiveness was calculated by dividing total costs by total emission reductions. Total costs are based on projected inspection fees, average repair costs and failure rates by test type. Total tons per day emission reduction estimates were based on current summer daily vehicle miles traveled multiplied by the estimated benefits in grams/mile. The table below presents the results of this analysis.

Cost-effectiveness of Alternative I/M Options

Options for I/M Test Procedures	I/M Benefits in 2012 (tons/day HC+NOx)	\$/ton HC+NOx
Current Program	22.8	\$4,965
OBD-Only Program	19.5	\$5,364

These results demonstrate that maintaining the present program is a more cost-effective strategy than OBD-only for the future. Connecticut's I/M program cost effectiveness compares favorably with costs of other motor vehicle control strategies for HC and NOx¹⁷ and provides the most emission benefits.

¹⁶ IBID.

¹⁷ Based on the Texas Emission Reduction Plan, most controls on diesel powered motor vehicles cost between \$5,000 and \$6,000 per ton of HC+NOx removed from the atmosphere. The cut-off for California's Carl Moyer program, which funds strategies available to reduce NOx, is \$13,600 per ton of NOx removed from the atmosphere.

Conclusions

The preceding discussion clearly indicates that Connecticut's I/M program is meeting the requirements of the CAA and that a change to an OBD-only program would have significant impacts on Connecticut's continuing progress toward attaining the 8-Hour Ozone NAAQS. Based on the facts presented, the following conclusions are presented.

- A number of Clean Air Act requirements would be affected by a change to an OBD-only I/M Program, including backsliding, a SIP revision and the potential for sanctions if CAA requirements are not met.
- The current program as it is presently constituted is meeting CAA requirements for ozone attainment progress, and in 2010, is projected to provide 19 of the 200 tons per day of air pollutant reductions included in Connecticut's 2008 Ozone Attainment Plan.
- The MOBILE6.2 modeling program presently approved by EPA indicates that a change to OBD-only prior to 2020 would result in backsliding.
- The backsliding estimated from a switch to an OBD-only program is consistent with EPA's April 2008 report on transitioning I/M, which clarifies that some areas may need to maintain tailpipe testing for longer than other areas since they need the emissions reductions to comply with the CAA.
- If Connecticut were to switch to OBD-only testing and eliminate tailpipe testing, it would have to avoid backsliding, making up for the loss of the air quality benefits by performing more frequent inspections, eliminating exemptions for new vehicles, and/or requiring additional and most likely, more expensive controls on mobile, stationary and/or area sources.
- Adoption of an OBD-only program in Connecticut would require statutory revisions, not only to implement the OBD-only program itself, but also to adopt provisions to avoid backsliding.
- If Connecticut implemented an OBD-only program, testing stations would inspect fewer vehicles; the resulting decrease in revenue would have an adverse effect on small businesses.
- Maintaining the present program, including the continuation of tailpipe testing, is the most cost-effective way to maintain I/M benefits.
- An OBD-only program could create perceived inequities from the fact that inspections still would be required for the generally cleaner 1996 and newer motor vehicles, while pre-1996 models, which historically have higher emissions, would be exempt. Owners of 1996 and newer vehicles would continue to pay for testing while the owners of older vehicle's fees would pay nothing.

- Innovative OBD testing strategies, such as kiosks or on road testing using Remote OBD, are unproven at this time; kiosks have safety and fraud issues while on road testing technology presents implementation challenges.¹⁸

In summary, it is premature to consider the exclusive utilization of OBD-only testing in Connecticut since the state needs to maintain the emission reduction credits being achieved by the current program and has little recourse for remediating the shortfall by designing and implementing another program that will be as cost-effective and will achieve the necessary reductions. The loss in enforceable reductions in the state would require that the costs be shifted to other sectors and most likely at a higher cost.

¹⁸ *Transitioning I/M*, April 2008.

